

## EkaPad Ergonomics:

### Eliminating twisted wrists and incorporating comfort into the EkaPad

When keyboarding for extended periods, ergonomics are important. EkaPad ergonomics are based on (1) a relaxed and safe position of the user's body, arm & hand and (2) a comfortable and easy feeling keyboard.

A relaxed, natural position of the arm, wrist and fingers is the basis of the macro ergonomics designed into the EkaPad. Size, lightness, and shape as designed into the micro ergonomics of the EkaPad make it comfortable to use, easy to feel the key locations and fitted to almost all hand sizes.

### EkaPad macro ergonomics



**Straight wrist** You keep a straight wrist when using the EkaPad.



**Many body positions** You can work with the EkaPad in your lap, resting on your knee, standing up, and on a desk with a mouse.



**No wrist pronation** With the EkaPad you maintain straight wrists, only two hands (not three) with a mouse, and no pronation as with a qwerty keyboard.



**Most hand shapes** EkaHand thumb holder and DualLock™ allow 3 degrees of freedom in the placement of the thumb to the EkaPad, accommodating almost all shapes and positions of thumbs with respect to the fingers.

**Opposed thumb** The EkaPad works with either hand. The thumb stays opposite the fingers, not flattened by qwerty.

### EkaPad Ergonomics

## EkaPad micro ergonomics

**Feel & comfort** Since the EkaPad is not looked at when used we have incorporated a number of ergonomic design features to give feedback on finger positions without creating sensitive hot spots. The EkaPad's feel and shapes are comfortable. The size of the keys accommodate all most all hands. Only a light pressure is required to actuate the keys. Even young children can press the keys without trouble, partially because the press is similar to a grip, a very natural and strong muscular movement. All the EkaPad's many ergonomic features make it easy and stress free to operate.

**Bowl design features** The keys are recessed within the bowls. The bowl edge gives a gentle touch to the boundary of the key area. The little finger area has an additional bump along its lower edge which helps direct the finger into its desired place. Both the horizontal and the vertical distance between the edges of the bowls work for >95% of humans, supplying an easily noticed yet non-irritating feel which helps the fingers maintain their proper location.

**Center keys** The keys in the center column are different from the outside keys to make it easy to feel them apart. This is accomplished by cupping them slightly and by making them bigger.

**Ridge** The ridge separates the main working area from the supplemental area. All characters except zero are chorded with the nine keys in the main working area.

**The vertical edges** of the EkaPad case are gently rounded.



**The three strong fingers** – ring, middle, index – with 1, 2, or 3 fingers, chord all the characters & commands found in a standard qwerty keyboard, as well as special Eka chords, and produce around 325 different chords. *see Little finger*

**One finger chords** 74% of American English can be typed using a one-finger chord plus space (a 2 finger chord – o & e together). Each one finger letter labels its key; these letters are the ones used the most.

**Little finger keys** Delete, Caps, Nlock and zero (uses Caps key) are not used as frequently as the three finger keys and are worked with the little finger.

**The EkaTetra logo area** The EkaPad can be held with the non-chording hand if the EkaHand (thumb holder) is not being used. The EkaTetra logo area can be gripped securely which lets the user chord normally.

*EkaPad shown actual size*

## Background to the ergonomic solutions

Initially, the design goal for what has become the EkaPad was to make a data input device which was small and would fit the form factor of a hand held digital assistant or cell phone. In pursuing this goal, it soon became apparent that with a small redirection in our vision, a vastly safer and better keyboard was possible. By this time we had invented a chording scenario easy to learn, implementing all characters and commands, and with features which expanded the utility of the EkaPad over other keyboards. So we now could focus our EkaPad design efforts on its ergonomics, comfort, and ease of use.

The ergonomic design features can be broken into two major areas: (1) the physical position of the user's arm, hand, thumb, and fingers; (2) the ease of locating each particular key, as the standard way to use the EkaPad is by touch-typing.

### Arm & hand position, EkaPad macro ergonomics

Move your hand and arm as if you were going to shake another's hand in greeting. That's a very natural and comfortable position. That's what we've aimed for when using the EkaPad. No pronation (rotation or twisting) of the wrist as with standard qwerty keyboards, and no carpal tunnel stress, when the hand/arm is in the hand-shaking mode.

In addition, we measured over 200 different hands for finger length, width, and curvature so the key spacing now works for almost everyone from young children, husky men, white collar adults, to old people. However, we found that the position and size relationship of a thumb to its hand varies all over the place. We spent three years and many designs trying to come up with something for everyone that would allow the thumb to hold the EkaPad. We were very frustrated; no solution worked for more than a few people. We kept plugging away. And then one day we found the solution; this first EkaHand prototype worked perfectly. The EkaHand, the device which wraps around the thumb and attaches the thumb to the back of the EkaPad, allows three degrees of freedom so that better than 95% of all people's thumbs can find a comfortable position when using the EkaPad.

With this usability, the user now can choose between chording an EkaPad in a desk stand, just holding the EkaPad comfortably on the lap, or even standing up and perhaps moving around while chording.

Also, either hand can use the EkaPad. If users enter data for extended periods of time, we recommend they switch hands regularly, which may reduce any repetitive stress, something they can't do with qwerty keyboards.

With the EkaPad it's now possible to keep one hand always on the mouse while the other hand enters data; no more back and forth between qwerty and the mouse. This also means you don't have to look back and forth between mouse and display every time you reach for the mouse.

### Creating the shape and feel: EkaPad micro ergonomics

Since the EkaPad is not looked at when used, its feel and comfort are very important. The design of the EkaPad contains many ergonomic features to make it easy and stress free to operate. Before we fixed the micro ergonomics, we tested the EkaPad beta prototype. More than 40 people participated in the testing. Almost everyone found it difficult to find *home* on the keypad, which slowed their chording speed.

So we set out to redesign the shape and feel of the EkaPad. We refined our design after each trial; we tested with lots of hands. After 23 trials of shapes, sizes, and feel we got the current micro ergonomic design for the EkaPad. It works.



16580 Maple Circle, Lake Oswego OR 97034 0 USA 877-747-1414  
www.ekatetra.com